PRESERVATION OF INFANTS.

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THE

PRESERVATION OF INFANTS

IN DELIVERY.

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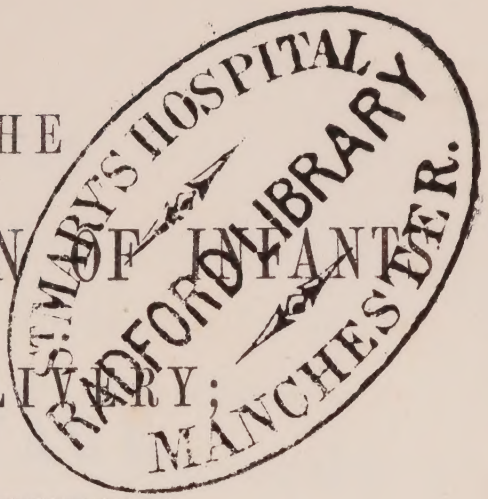

THE PRESERVATION OF INFANTS IN DELIVERY;

BEING AN EXPOSITION OF

THE CHIEF CAUSE OF MORTALITY

IN

STILL-BORN CHILDREN.

BY

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MEDICAL SUPERINTENDENT OF BILSTON AND DARLASTON, IN STAFFORDSHIRE,
DURING THE VISITATION OF CHOLERA IN 1832.

LONDON:
JOHN CHURCHILL, PRINCES STREET, SOHO.

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PREFACE.

Several years of public and private practice as an Accoucheur, have enabled me to watch the different phenomena which presented themselves to my mind, under nearly the same set of circumstances. The period which has elapsed from the first moment I doubted the supposed cause of death in preternaturally still-born children in which the ablest accoucheurs of the day had implicit belief, has afforded me ample time to put a conscientious value upon the conclusions at which I have arrived; I am thus enabled to record my

firm conviction, that a large amount of infant life will be saved by adopting the practice which I now suggest.

It was my anxious wish to have had the subject of this essay thoroughly discussed by the Medical Profession, both in England and France, before I ventured on its publication, but, from circumstances over which I had no control, I have been prevented from obtaining such a discussion in England.

When it is considered that the number of children still-born is very considerable, that many of them are amongst the strongest and finest in regard to development and that death takes place at the very moment of birth, the publication of this essay will, I trust, be not unfavourably accepted,

even though the evidences which go to establish the chief cause of mortality in still-born children, be esteemed less conclusive than they appear to my own mind.

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THE observations of Mr. Dalrymple prove satisfactorily to my mind that the after-birth, as the connecting link between the mother and her unborn infant is called, is made up of innumerable sub-divisions of the umbilical cord, terminating in beautifully coiled and convoluted capillaries, which form tufts or *bouquets* of vessels, in intimate relation with the blood vessels of the uterus—vessels rich in arterial blood, and well adapted to impart a sufficient amount of arterialization for the healthy growth of the infant.

With this simple statement of a subject which has called forth the talent of the best accoucheurs of several ages, and which perhaps is still imperfectly understood, I shall at once

proceed to solve the question which I have raised for myself—the chief cause of mortality in still-born children. The subject has hitherto been left wholly untouched by the medical profession, and it has no place in our bills of mortality. I have been able, however, to bring together a few facts, which I record here in order to show that the subject is worthy of attention.

In Glasgow, in the six years ending with 1826 the deaths were 26,109, and the still-births 1,831; and in New York in 1827 the deaths were 5,181, and the still-births 291.

The still-births to the births in per centages are, in

Canton de Vaud, Switzerland	14·2
Bloomsbury, London	10·4
Strasbourg	8·3
Stockholm	7·6
Dublin	6·7
Hamburg	6·6
Iceland	6·4
Amsterdam	5·9
Edinburgh	5·6
Guy's Hospital	5·5
Paris	5·2
Berlin	5·2
Dresden	5·2
Prussia	4·7

London	4·1
Denmark	4·0
Vienna	4·0
Hanover	3·8
Sweden	2·5
Finland	2·4

The preternatural births to the births, in per centages, are, in

Dublin	3·0
London	2·3

The still-births to the respective preternatural births, in per centages, are, in

LONDON.

Upper Extremity	66·6
Umbilical Cord	58·3
Breech	50·8
Feet	50·1

DUBLIN.

Umbilical Cord	75·2
Upper Extremity	50·0
Feet	48·8
Breech	30·1

The male still-births to the female still-births, in per centages, are in

Berlin	42·0
London	40·0
Halle	40·0
Prussia	35·0

Wurtemburg	27·0
Geneva	25·0
Paris	22·0
Dublin	22·0
Amsterdam	20·0 *

Of two hundred and fourteen women who died in child-bed in the Dublin Lying-in Hospital, there were of

Living children	76 males	to 73	females.
Still-born children	50 „	15 „	†

The male infant to the female infant is in excess in

Length of body	½ an inch.
Weight of body	9 ounces.
Area of head	1 square inch.

It is generally understood by those who have paid attention to still-born children, although their observations have not been reduced to figures, that in different parts of the same country, and even in different parishes of the same city, there is a very marked difference in the rate of mortality.

In the parish of Bloomsbury, for instance, the still births to the births are as high as ten

* "Abstract of the Medical Sciences," by Dr. Ranking.

† "Philosophical Transactions for 1786," p. 349.

per cent., although for the whole metropolis they are only four per cent., and in Guy's Hospital, the mortality in presentations of the breech is higher than those of the feet, which is generally the reverse.

Among the number of children born in the Prussian dominions during the year 1838, which was 566,339, there were 21,233 still-born; consequently, to nearly every 27 births, there was *one* which cost the child its life. In some provinces, however, the proportion is very different. For instance, in Silesia there were

Oppeln, births	. 38,140;	still-born,	1011
Leignitz .	. 31,634;	„	1740

or one still-birth to thirty-eight births in the former, and one to eighteen in the latter place.

Leignitz it appears had, in proportion to the number of births, more than double the number of still-born children, although the institutions and means of nursing and delivering pregnant women are certainly not inferior there to those in the district of Oppeln. In the Rhine province there was an almost equally remarkable difference between two districts

immediately adjoining, and very similar in many respects. These were

Aix-la-Chapelle, births 14,044; still-born 449
Cologne . . „ 17,556; „ 954

or one still-birth to thirty-one births in the former, and one to eighteen in the latter place; that is, the number of children still-born was in such a rate that, for an equal number of births, Aix-la-Chapelle had only three children born lifeless, while Cologne had five.

The smallest proportionate number of still-born children occurred, and nearly in the same degree, in two districts of the kingdom far distant from each other, and totally dissimilar in their habits and character. These were

Munster, births, 13,276; still-born 325
Bromberg „ 17,611; „ 434

In each district, therefore, there was one still-born child to nearly forty-one births.

"It is clear," remark the authorities in their official report to His Majesty the King of Prussia, from which these statistics are taken, "that even in districts where above ten thousand births take place annually, nothing less than the experience of a considerable number

of years can furnish certain data for forming a judgment as to the causes of these differences."

If I am not greatly mistaken, the cause of these marked differences will be found in the accoucheur departments of the several divisions of the country or city, and that they afford the means of testing the amount of intelligence that is brought to bear upon obstetric science.

I am not sufficiently acquainted with Prussia to judge how far the Legislature are to blame for this state of things, but I know something of the legislative enactments at my own home, and I am convinced that a better nursery for a healthy ignorance and a rough brutality cannot be found.

The deaths in Prussia in 1838 are thus classified:—

Suicide and Violence . . .	6,983
Child-bed and Still-born . .	25,528
Disease and Decay of Nature . .	49,124

This fearful account of Prussia should have long since led to an inquiry in England, for the purpose of ascertaining its position in this respect.

These few facts are sufficient to call attention to the mortality in still-born children, and to show that the subject is one of considerable research; so much so, indeed, that it will bear treating under two heads, that of the natural and that of the preternatural still-born child, or, in other words, that of the still-birth head first, and the still-birth feet first.

The first class of presentations are sufficiently protected by the fact, that if nature refuses her work, it is impossible for the hand to grasp the head on account of its bulk, therefore the only course left is the use of instruments, which must necessarily be made known to the patient and attendant, and if unskilfully handled, will at once be apparent. A value is thus put upon the operator, and the risk is consequently thrown into the hands of a limited few, who by this means become expert and valuable accoucheurs.

Berlin and Dresden offer a productive field to the young accoucheur. Instruments for the extraction of the head are used in

London, once in	.	.	. 724 deliveries.
Dublin „	.	.	. 684 „

Paris, once in	. . . .	269 deliveries.
Dresden	„	14 „
* Berlin	„	7 „

The consideration of this class of still-births may then be left for another day, in order that the chief cause of mortality in the preternaturally still-born child, or the still-birth feet first, may be studied, for here the use of instruments is rendered unnecessary. The legs afford so firm a hold that the neck of the infant has been often dislocated, and even the head separated from the body without the attendant being aware that anything extraordinary is in progress.

The usual mode of investigating such a subject is to select, for experiment, a few animals, such as the dog, the rabbit, or the guinea-pig, but I have preferred to be a gleaner in this field of science, and I have built no forced conclusions upon the fruits of my labour.

Dr. Ashwell has expressed an opinion, that the after-birth is not detached from the uterus before "the entire birth of the infant†," in

* "Abstract of Medical Science," by Dr. Ranking, vol. ii., p. 83.

† "A Practical Treatise on Midwifery," by Samuel Ashwell, 8vo., Lond. 1828. p. 423.

the face of the remark of Mr. Abernethy, that "an infant does not grope its way into the world, and get through just as a chimney-sweeper gets out of a chimney, by any efforts of its own; it is expelled, and the uterus must be perfectly contracted when it is expelled."

The conclusion to be arrived at from this quotation is, that the uterus, by its contraction, expels the infant, and, therefore, diminishes in size in proportion to the loss it sustains; and I doubt if Dr. Ashwell is prepared to deny that the conclusion is sound. As the after-birth has no such power of contraction, it must, evidently, sooner or later, be cast off, and it therefore becomes important not only to ascertain the usual period of detachment but the usual seat of attachment.

Naegelè and Montgomery have proved, by statistical data, that the attachment of the after-birth is no longer to be sought at the bottom of the uterus, but that its legitimate position is against the walls, and a digest, which I have just made, of forty-one cæsarean operations, tends to establish the views of

these observers. It is not necessary for my present purpose to determine, which of the four walls most commonly affords attachment to the after-birth, but I may mention, that, as far as my researches have extended, they are in favour of the anterior wall. The observations of Naegelè embrace six hundred cases, and those of Montgomery one hundred. In seven only of the former was the seat of the after-birth found at the bottom of the uterus, and in three only of the latter.

The wisdom of this arrangement is so apparent, that it is difficult to account for the recentness of its discovery, and the apathy still existing on the subject among the accoucheurs; for if it were situated at the bottom or the neck of the uterus, it would be much sooner detached than from its walls. The effect upon mother and infant when the neck is the seat of attachment has been fully discussed in the recent controversy respecting the presentation of the after-birth, but not so when the bottom of the uterus forms its bed. An attachment here I hold would be as fatal to the infant as that to the neck of the uterus is to both mother and

infant; the cause is different but the effect is similar, the result being one death instead of two. It will be convenient, then, to speak in future of the natural and preternatural seats of the after-birth, the former term being used to describe its attachment to the walls, and the latter either to the neck or bottom of the uterus.

The first stage of delivery will affect the condition of the after-birth, when naturally placed, in a very slight degree; the second stage, from the loss of the *waters*, will subject its *bouquets* of vessels to separation from the uterus; and the third stage will threaten its separation altogether, with a rapidity proportionate to that of the delivery, but whenever the separation of the after-birth takes place, it will have previously been at its maximum of contraction, and subsequently at its maximum of expansion, or in other words of small and large capacity for receiving blood.

It is admitted by the best observers, that the moment the after-birth is detached the life of the infant is in danger, and sometimes that of the mother, yet the means of deciding the precise moment of detachment has not

hitherto been sought. For the want, then, of data for this purpose, it will be as well simply to consider the uterus as an inverted elastic oval bag, containing an infant floating in water. The loss of the water will necessarily induce a contraction of the bag, the expulsion of the head, and subsequently of the shoulders and breech of the infant, further contraction, and so to the completion of the delivery.

If we consider the contraction which must necessarily ensue on these several losses of volume to the contents of the uterus, it will appear obvious that there is a period when the after-birth will no longer have attachment. If we reverse the course of delivery, as nature sometimes reverses it, and suppose the first loss to be the feet, next the breech, and afterwards the shoulders, it is equally obvious that the after-birth will be similarly affected.

The question then suggests itself, whether the after-birth can possibly have attachment to the uterus after it has so far contracted as to have expelled the head of the infant, or, its equivalent in bulk, the feet? To assist us in the answer, there is the fact, that in the natural birth the attachment is no longer

necessary; and the cases which occurred to Dr. Collins can scarcely be accounted for, except on the supposition that henceforth the attachment no longer exists.

"Generally speaking, no assistance whatever should be given," in a natural delivery, observes Dr. Collins, "yet I have known several instances where the infant was lost by adhering strictly to this rule, where uterine action was tardy in returning, after having expelled the head*." The loss of life in my opinion, is here clearly attributable to the separation of the after-birth before delivery, and should induce us to abandon the present practice, and to complete the birth of the infant when the head is expelled.

I know of no reason to justify our incurring any longer the risk of losing the infant between the birth of the head and shoulders, which has often been the case. "I am aware," writes Dr. Ryan, the able writer on Medical Jurisprudence, "that Dr. Beck employed all his argumentative powers against the probability of an infant, whose head was expelled, and who had

* "A Practical Treatise on Midwifery," by Robert Collins, M.D., p. 5.

respired, losing its life during delivery*, but his countryman, Dr. Hossack, has recorded a case in point, and there is another in the 'Medical and Physical Journal,' vol. 43†."

Uniformity in detachment of the after-birth in natural and preternatural deliveries, will help to explain why footlings should more frequently be still-born than children of breech presentation‡, and the latter than those of natural birth; the duration of life in these several presentations is in exact proportion to the amount of loss the uterus has sustained, compared with the time which elapses from the supposed period of the detachment of the after-birth to the birth of the infant.

This consideration should, I think, relieve every practitioner from the fancied necessity of finding a snug birth for the umbilical cord between the legs of the infant§, where common

* "Elements of Medical Jurisprudence," by Theodric Romeyn Beck, M.D.

† "A Manual of Medical Jurisprudence," by Michael Ryan, M.D., p. 300.

‡ "Blundell's Principles and Practice of Midwifery," p. 77.

§ "Principles and Practice of Obstetric Medicine and Surgery," by Dr. Ramsbotham, p. 400; "Blun-

sense would never have placed it, while at the same time he is sleeping over the difficulty of the greater risk to the life of the infant from other causes.

Thus much regarding the practice in preternatural deliveries over which the accoucheur has more or less control. Let us now consider the state of the uterus and after-birth during the birth of the head of the infant in preternatural deliveries, when parts of seconds become important. By the time the uterus has parted with the body of the infant, feet first, it must be so reduced in size, that to contend for the attachment of the after-birth to its walls, when the head only is retained, would appear to be perfectly idle. The work of Dr. Denman, however, supplies us with some facts to reason upon, which are more worthy to occupy our time than any such discussion.

"In all cases," Dr. Denman observes, "in which the infant is expelled or extracted by the breech or inferior extremities, the after-birth is usually managed without difficulty or

dell's Principles and Practice of Midwifery," p. 77; "Theory and Practice of Midwifery," by Fleetwood Churchill, M.D., 12mo., London, 1842.

danger, and it is generally, though not always, excluded more easily, and in a shorter time, than after a natural birth*." It is surely right to infer that in these cases the detachment took place before the completion of the birth; in fact Dr. Waller and Dr. Burns are of opinion that this often occurs.

In a note to the seventh edition of Dr. Denman's Introduction to Midwifery Dr. Waller observes, that "the after-birth in presentations of the breech or inferior extremities is frequently expelled from its attachment to the uterus before the head of the infant is expelled†;" and Dr. Burns remarks, that "in breech cases the after-birth is sometimes speedily detached from the uterus before the delivery is effected‡."

The accoucheur anticipates, when the after-birth is detached before delivery takes place, that the death of the infant will sooner or later be the consequence; yet the actual dura-

* "Denman's Introduction to Midwifery," 7th Ed. p. 344.

† "Denman," 7th Ed., Edited by Dr. Waller, p. 344.

‡ "The Principles of Midwifery," by John Burns, M.D., 9th Ed. p. 413.

tion of its life in the uterus under such circumstances is altogether a problem which he is unprepared to solve. A *resumé*, therefore, of what has been written by others in regard to the life of the infant, in the process of birth in preternatural delivery, will next be worthy of our attention.

Dr. Merriman considers "the danger to the infant, in presentations of the inferior extremities, to arise principally from the compression of the umbilical cord between its own head and the body of the mother*." "Should there be any considerable obstruction to the getting away of the head, the infant is destroyed," in the opinion of Dr. Collins†, "by pressure on the umbilical cord, as every practitioner is aware, as surely as if after its birth we were to prevent its respiration†."

"The wish to extract the head of the infant speedily," observes Dr. Denman, "is founded on the apprehension justly entertained that in this position the life of the infant is in the

* "Synopsis of Difficult Parturition," by Dr. Merriman, p. 73.

† "A Practical Treatise of Midwifery," by Dr. Collins, pp. 43 and 342.

most imminent danger from the compression of the umbilical cord*."

"Injurious pressure on the umbilical cord is," according to Dr. Campbell, "destructive of infant life†."

Dr. Ashwell considers "the early delivery of the head of vital importance, as between it and the pelvis the umbilical cord may suffer fatal compression‡."

"The comparative danger of all preternatural deliveries," observes Dr. David D. Davis, "is in a great measure imputable to the fact of the head being the part last born, from which arises the obvious liability of the umbilical cord to fatal pressure during the abduction of the head§."

"When the umbilical cord is compressed," says Dr. Blundell, "unless the infant be promptly abstracted, it will probably die suf-

* "Denman's Introduction to Midwifery," 7th Ed., p. 359.

† "Introduction to the Study and Practice of Midwifery," by Wm. Campbell, M.D., p. 84.

‡ "Practical Treatise on Parturition," by Dr. Ashwell, p. 348.

§ "Principles and Practice of Obstetric Medicine," by David D. Davis, p. 835.

focated, much in the same manner as if, after delivery, it were to be wrapped up in a blanket, or thrown into water*."

Dr. Ramsbotham† and Dr. W. Hunter† call attention to the pressure of the umbilical cord, which places the infant "in great danger of strangulation," and Dr. Burns‡, "lest it suffer fatal compression."

"The consequence of compression of the umbilical cord," in the opinion of Dr. Lee, "is the death of the infant before its expulsion by a process similar in all respects to asphyxia after birth§." Every writer since the time of Denman could be quoted to the same effect.

The distinguished accoucheurs I have mentioned, with the exception of Dr. Waller and Dr. Campbell, have not favoured us with their opinion respecting the effect of the detachment of the after-birth before the completion of the delivery upon the life of the infant; and Dr.

* "Blundell's Principles and Practice of Midwifery," p. 133.

† "Principles and Practice of Obstetric Medicine and Surgery," by Dr. Ramsbotham, p. 404.

‡ "Principles of Midwifery," by Dr. Burns, p. 413.

§ "Lectures on the Theory and Practice of Midwifery," by Robert Lee, M.D., p. 352.

Ashwell insists, as I have before stated, "that it does not separate before the entire birth of the infant*."

"With the separation of the after-birth," observes Dr. Waller, "there is of course a cessation of its function, and the infant's life is placed in great jeopardy, unless the atmospheric air has access to its lungs†." "An extensive detachment of the after-birth," writes Dr. Campbell, "is destructive of infant life‡."

The evidence here adduced, if it is implicitly accepted, leaves no room to doubt that the function of the after-birth, in relation to the infant, is destroyed as soon as it is detached, or as soon as there is pressure on the umbilical cord, and that the detachment of the after-birth and pressure on the umbilical cord, while the birth is yet incomplete, tend to the same result, namely, the death of the infant.

It is highly important, then, to ascertain the duration of infant life under these circum-

* "Practical Treatise on Parturition," by Dr. Ashwell, p. 423.

† "Denman's Introduction to Midwifery," edited by Dr. Waller, 7th Ed., p. 344.

‡ "Introduction to the Study and Practice of Midwifery," by Wm. Campbell, M.D., p. 84.

stances as our only guide to the amount of risk to which we are justified in subjecting the mother. Yet we have hitherto been satisfied with loose data for the purpose, in fact, with only indefinite remarks, such as the following.

"Compression of the umbilical cord will *quickly* destroy the life of the child*." "Of the causes of suspended animation pressure on the umbilical cord is by far the most dangerous; for cases frequently occur where the head is much compressed for many hours without any material injury to the infant; but where, had the umbilical cord been similarly situated merely for *a few minutes*, the death of the infant would be certain†."

"Let the umbilical cord sustain a sufficient amount of pressure to interrupt the circulation in it but for a *few minutes*, and the infant will inevitably be still-born‡."

"If the head remain long after the body is born, the compression upon the umbilical cord

* "A Practical Treatise on Parturition," by Dr. Ashwell, p. 351.

† "Introduction to the Study and Practice of Midwifery," by Wm. Campbell, M.D., p. 564.

‡ "Principles and Practice of Obstetric Medicine," by David D. Davis, p. 838.

will be so great, as *speedily* to cause the infant's death*."

"Pressure upon the umbilical cord for a *very short time* will in some cases kill the infant†."

"If the circulation in the umbilical cord be arrested for *a few seconds* only in some infants, they cannot be made to breathe after birth‡."

If a doubt had existed in my mind that I was labouring in an unexplored field, these quotations would have dispelled that doubt.

In a question of life and death of two human beings, at a period the most eventful and interesting—at a season of expected joy and congratulation—we have hitherto been contented to leave to a loose presumption the amount of endurance and risk to which the mother and infant are to be subjected.

Since it is not known, then, how long the infant lives in its independent yet unborn state,

* "Synopsis of Difficult Parturition," by Dr. Merriman, p. 78.

† "Lectures on the Theory and Practice of Midwifery," by Robert Lee, M.D., p. 334.

‡ Idem, p. 352.

it is certainly incumbent upon us to inquire into the probable duration of life in that condition.

The late Dr. Edwards, a distinguished member of the French Institute, and Founder of the Ethnological Society of Paris, has long since furnished us with the means of approximating to the truth in his work on the physical agents on life.

The following experiments of Buffon and Legallois led to Dr. Edwards' inquiries. I quote from Dr. Hodgkin's translation of this work of acknowledged high merit*.

A large parturient bitch was compelled by Buffon to bring forth her offspring under warm water; at the expiration of half an hour they were taken out, and all found alive; after breathing for half an hour, they were plunged into milk for half an hour; and even a third time they were so subjected, yet they lived and thrived. Legallois made a similar observation on rabbits, and he extended his experiments so far, as to gather the result that this

* "On the Influence of Physical Agents on Life," by W. F. Edwards, M.D. Translated from the French, by Dr. Hodgkin, pp. 85—90.

capacity of asphyxiated life diminishes as the adolescence of the animal proceeds.

Dr. Edwards, pursuing these researches, found that some animals, such as the guinea-pig, from the very commencement of life, enjoy but a very limited degree of this privilege; hence he concludes that those animals which in the immature state possess the highest faculty of generating heat, are those least capable of sustaining the privation of air, and *vice versâ*.

To determine the influence of external temperature on the duration of life during asphyxia in warm-blooded animals, kittens a day or two old were placed in water, at different temperatures. At 32° Fahr. they lived four minutes and thirty-three seconds, taking the mean of nine experiments; at 50° ten minutes and twenty-three seconds; at 68° it increased considerably, being on an average thirty-eight minutes and forty-five seconds. At 86° a retrograde course commenced, as they lived but twenty-nine minutes; lastly, at 104° they lived ten minutes and twenty-three seconds.

There are, therefore, two principal conditions

which influence the life of warm-blooded animals deprived of air; first, the quantity of heat developed by the animals themselves, and, secondly, the external temperature to which they are exposed. In man also the power of generating heat is at the minimum in infancy, and increases with adolescence. Thus a seven months' child evolved heat equivalent to 89° 6′ Fahr.; at two days old, 94° 55′; adults, 97°*.

If we could decide what the distinguished accoucheurs I have quoted mean by *quickly, a few minutes, speedily, a very short time,* &c., we should be able to ascertain if these experiments of Dr. Edwards uphold the theory, for it is but a theory, which has been handed down to us by our forefathers, and implicitly believed at the present moment, of the death of the infant from suffocation—the effect of pressure on the umbilical cord, or detachment of the after-birth.

It is, in fact, impossible by the indefinite remarks as to time, that these writers can

* "On the Influence of Physical Agents on Life," by W. F. Edwards, M.D. Translated from the French, by Dr. Hodgkin, pp. 85—90.

mean anything like that which the experiments above quoted show to be the period the infant might live in the uterus after the function of the after-birth is destroyed.

If, on the contrary, it is found to die in less than a quarter of an hour, as I am prepared with all these authorities to maintain that it will, then the theory of suffocation is no longer tenable. We must, therefore, seek for some other cause which, in the terms of our best observers, destroys life *quickly, speedily, in a very short time, in a few minutes*, or, as Dr. Lee observes in some cases *in a few seconds.*

It will be as well, however, first, to test the grounds for the confidence which the accoucheurs have in their theory of suffocation from pressure on the umbilical cord, or detachment of the after-birth.

"We may presume," says Dr. Blundell, "that the infant is dead when the umbilical cord is flaccid and cold, and has been for an hour or more without pulsation*."

"After the expulsion of the breech," writes

* "Blundell's Principles and Practice of Midwifery," p. 133.

Dr. Denman, "the continuance of the pulsation in the umbilical cord very satisfactorily proves that no compression of importance has taken place; the infant of course being in no danger, there is no occasion to hurry the delivery; but should the pulsation, which was at first lively and strong, gradually decline, and then altogether cease, the head must, if possible, be speedily extracted, or the infant will be inevitably lost, there being no other way of removing the compression, or of preserving its life*."

"If pulsation continue regular or steady," observes Dr. Burns, "the infant is not in danger from want of respiration, for the infant mode of life is continuing†."

Dr. J. Hall Davis lays down as a rule, "when the umbilical cord is found to pulsate feebly, or just cease to pulsate, that we should proceed without loss of time, but at the same time carefully to deliver by the forceps‡."

"As long as pulsation is to be felt in the

* "Denman's Introduction to Midwifery," 7th Ed., pp. 341—359.

† "Principles of Midwifery," by John Burns, M.D., 9th Ed., p. 635.

‡ "Lancet," for 1844, p. 408.

umbilical cord," Dr. Merriman considers "the infant's life is in no immediate danger*."

In the first place these distinguished accoucheurs disagree, the majority are for delivery as soon as the pulsation in the umbilical cord ceases; and Dr. Blundell in practice is not particular for an hour or two, but in principle insists that the infant be promptly abstracted, or it will probably die suffocated, "much in the same manner as if, after delivery, it were to be wrapped up in a blanket, or thrown into water†." In all cases the purpose seems to be after the old adage, "to lock the stable door when the steed is stolen."

The guide for the accoucheur, we are told, is the pulsation in the umbilical cord. This is his test, whether or no the function of the after-birth is destroyed, or in other words whether or no the infant is being strangled; the commencement of the strangulation being marked by the cessation of the pulsation in the umbilical cord. With such a guide the

* "Synopsis of Difficult Parturition," by Dr. Merriman, p. 79.

† "Blundell's Principles and Practice of Midwifery," p. 133.

distinguished accoucheurs of the day proceed, instrument in hand, to the rescue of the infant*; or if it be a case of prolapsed umbilical cord, they manipulate for hours to save it "from compression, that the infant may not die strangulated." "It is to remove the umbilical cord," observes Dr. Merriman, "from the effect of this compression, that the assistance of the accoucheur is required†."

The ground assumed is, that the infant dies from pressure on the umbilical cord, which causes an interruption in the circulation, and thereby cuts off the connexion between it and the mother, before it is able to breathe and maintain an independent life.

In the first place, pressure on the umbilical cord will not for a considerable time stop its pulsation. I have long been in the habit of calling attention to the pulsation in the piece of umbilical cord attached to the infant while resting in the lap of the nurse, and therefore not only compressed, but tied with tape, and cut asunder.

* "Denman's Introduction to Midwifery," p. 341; Dr. J. Hall Davis, "Lancet" for 1844, p. 408.

† "Synopsis of Difficult Parturition," by Samuel Merriman, M.D., p. 93.

The pulsation of the umbilical cord, therefore, is a test of the infant's continued life, but is none of the absence of pressure or of the continued attachment of the after-birth to the uterus.

Secondly, I hold that fatal compression of the umbilical cord is of very rare occurrence, and the theory of suffocation from that cause altogether unfounded and unphilosophical. The experiments of Dr. Edwards are demonstrative of a capacity to retain life far beyond that which is found in the course of practice, and every now and then cases occur which are inexplicable on the theory of suffocation from detachment of the after-birth, or pressure on the umbilical cord.

Dr. Denman has remarked, that "when the head has been detained a considerable time, a few cases have terminated more favourably than he could have expected; and he has been agreeably surprised with the discovery of some faint signs of life, which by the assiduous and careful use of the common means, have been improved, and the life of the child at length perfectly recovered*."

* "Denman's Introduction to Midwifery," 7th Ed., p. 359.

In the last case of prolapsed umbilical cord which came under the observation of Dr. Robert Lee, a great part of the *waters* had escaped at the commencement of labour, and a long coil of umbilical cord immediately followed; "but though," he observes, "the labour continued for eight or ten hours, and the vessels must have been subjected to great pressure from the head in the pelvis, yet the infant was born alive by the natural efforts."

"If the circulation in the umbilical cord," adds Dr. Lee, "be arrested for a few seconds only in some infants, they cannot be made to breathe after birth, while in others, even when the blood has almost entirely ceased for some time to flow through the vessels—at least has been so feeble that it could scarcely be felt —respiration has been established readily on exposure to the air*."

Even the master-mind of a Denman and the ingenuity of a Lee are incapable of unravelling these puzzles by the theory they have advocated. There are two ways in my opinion of accounting for the preservation of life in these

* "Lectures on the Theory and Practice of Midwifery," by Robert Lee, M.D., p. 352.

cases,—attachment of the after-birth without compression of the umbilical cord, or positive compression of the umbilical cord with or without attachment of the after-birth.

A more complete history of the case recorded by Dr. Robert Lee would have assisted in testing my views, as to the probable period of detachment of the after-birth. It, however, should tend to make Dr. Merriman reconsider his opinion so strongly expressed, "that it is to remove the umbilical cord from compression that the assistance of the accoucheur is required."

The condition of the after-birth and of the umbilical cord in preternatural deliveries, has not been recorded, which is somewhat remarkable, since hundreds of cases of presentation of the after-birth have of late been published; and of the condition of the infant there is but this solitary remark of Dr. J. Hall Davis, "the child was blanched*." Under these circumstances the following cases are important.

"At the eight and a half month of gestation, and five minutes after death, M. Huguier performed the Cæsarean operation at the

* "Lancet" for 1845, p. 94.

Hopital St. Louis;" the child was pale and motionless, the pulsation of the heart could scarcely be felt, the child lived.

"At the eight and a half month of gestation, and twelve minutes after death, M. Monrod performed the Cæsarean operation at the Maison d'Accouchement.

"The after-birth was found to be inserted at the anterior portion of the uterus. After the section of the umbilical cord, about a pint of blood escaped from the uterine ends. The infant was pale and motionless, and the heart pulsated very feebly. It died five hours after birth*."

Mr. J. G. Atkinson, of Romney Terrace, Westminster, performed the Cæsarean operation twenty-five minutes after death. "The after-birth was found closely adherent to the bottom of the uterus, which he divided, and from which a large quantity of blood was effused. The infant was dead, which seemed to arise from the sudden evacuation of a large quantity of blood in cutting through the after-birth†."

* "Lancet" for 1829–30.

† "Lancet" for 1840.

The cases of M. Huguier and M. Monrod are those of blanched infants, to which may be added that of Dr. J. Hall Davis, mentioned at page 33, and those of M. Monrod and Mr. Atkinson of gorged after-births.

In my own practice this has long been the result of my observation, and it is worthy of remark, in a case of footling, which, after a lapse of twenty-nine minutes from the moment the feet came into the world to the completion of the delivery was still-born, that Mr. Wood, assistant to Mr. Chappell, of George-street, Hanover-square, was, without the slightest hint on my part, so struck with the gorged condition of the after-birth, as to ask of me the cause, which I promised some day to explain to him.

I may mention, in addition, the case of a near relative of the late Mr. Nathan Dunn, the proprietor of the Chinese Exhibition. It was her fourth delivery, but her first in this country. More than ordinary care was thought to be necessary as, while residing in America, she had been the subject of a cross-birth, which terminated in the delivery of a still-

born son, whose head was nearly separated from the trunk.

It happened, on the present occasion also, to be a preternatural delivery, that of the breech. The history of the first cross-birth led me to expect some difficulty in the extraction of the head, and I was, consequently, more than usually alert. I marked the instant of the delivery of the breech and the moment of birth, which occupied twenty-three minutes, of which time certainly not more than half was due to the extraction of the head.

Although the manipulation, in contradistinction to the previous preternatural delivery, was completed without the mother being even aware that it was a cross-birth, the infant was still-born. As in the former cross-birth, this was a boy.

Acquainted as I was with the experiments of Dr. Edwards, I was at a loss to account for so speedy a death, and from that time I have sought for the cause of death of infants preternaturally still-born, by careful attention to the progress of such deliveries, the condition of the new-born infant, and of the after-birth.

Mr. Grove Berry relates a case of a shoulder presentation, in which from one pain, "aided by great voluntary efforts, protruded child, legs, feet, umbilical cord, after-birth and all, into the world. The infant half an hour before the birth, was alive, yet the abdomen and head passed together through the pelvis. The infant was certainly not large, and the pelvis extremely well made. The uterine contractions, moreover, were violent; had their condition been otherwise, on the authority of Naegelè, the birth could not have been effected without the dismemberment of the infant; and it is certain, notwithstanding the numerous opposing authorities, that the infant, if it had continued to live, could not have been born in its then position*."

So relaxed a state of the infant within half an hour of its death, can only be accounted for upon the supposition that it had parted with its blood, and died the death of syncope—the death that Mr. Grove Berry has evidently assigned to it. If Mr. Grove Berry had directed his attention to the after-birth, he would, I have little doubt, have found it gorged.

* "Medical Gazette" for 1832-3, p. 46.

Mr. Louis Parnell, who has been most industrious in his attendance upon the poor married women relieved, under my own superintendence, at the Blenheim Street Free Dispensary, has just furnished me with the following interesting case, which is in full confirmation of my views.

"Elizabeth George, of 66, George Street, Chelsea, was confined at the full period of gestation of twin boys, the first being a natural birth. At the expiration of half an hour, the second infant presented by the feet, and owing to some little difficulty in the extraction of the head, the manipulation occupied ten minutes.

"This infant was not only still-born, but exsanguine, and for several hours after it was resuscitated merely uttered a moaning sound; the after-birth was found to be double, and that portion which nourished the second infant was gorged, while the other portion was natural."

There can be no doubt that the suspended animation of the second infant was from syncope, the result of the engorgement of its portion of the after-birth. Of the two

infants, the still-born was the most healthily developed.

"In syncope," Professor Sharpey remarks, "the face is *pale* and *bloodless*, the features sunk and contracted, and the eyes partially or entirely closed. In asphyxia, the face is livid and bloated, the lips swollen, and the eyes open.*" So marked a difference, therefore, between asphyxia† and syncope will not leave us long in doubt of the chief cause of death in still-born children.

It will surely be allowed that the evidence which I have brought forward tends to show that the frequent death of the infant in preternatural deliveries arises from syncope, and not from asphyxia; in fact, from the want of compression of the umbilical cord, and not from the dreaded compression of it.

The premises are these.—Just before the after-birth is thrown off, it is at its maximum of contraction, and therefore preventing the escape of blood from the infant, and imme-

* "Report on Asphyxia to the British Association for the Advancement of Science."

† In using the term "Asphyxia," it must be borne in mind that I am not responsible.

diately afterwards at its maximum of expansion, or favouring the escape of blood from the infant.

This is a matter of little moment in the natural delivery, because the new life that is set up the moment the head is born encourages the new and discourages the old circulation, but it is all-important in the preternatural delivery, for it then acts as a moist sponge would act when released from the hand and placed in contact with water.

It is from this congestion in the after-birth that I believe the death of the infant occurs within the space of time at which the practice of our best accoucheurs has fixed it; "for it is almost incredible," to use the words of Dr. Francis H. Ramsbotham, "how small a loss of blood is sufficient to destroy a newly-born infant. A few drachms oozing from the umbilical cord, if the ligature has been loosely tied, has been known to cause a fatal result*." The death-blow is therefore given before the umbilical cord is even threatened with compression.

* "The Principles and Practice of Obstetric Medicine and Surgery," by Francis H. Ramsbotham, M.D., p. 485.

Doctor Hodgkin has suggested to me, that the very rapid death of the infant in those cases in which the after-birth is congested is in part attributable to the peculiarity of the fœtal circulation. His ideas are couched in the following terms :—

"In connexion with thy remarkable and important observations on the death of children preternaturally still-born, by which the loss of life is very clearly attributed to the exsanguine state of the fœtus, where blood is accumulated in the relaxed after-birth, there are some points in the fœtal circulation which deserve attention. It appears to me that they not only tend to confirm the conclusion at which thou hast arrived, but also to explain the failure which in these cases attends almost every attempt to restore the lost animation.

"It has been shown by Winslow and some other anatomists, and very lucidly developed in a paper by Edward Cock, read before the Physical Society of Guy's Hospital some years ago, that owing to the peculiarity of the fœtal circulation, as respects the Eustachian valve, the foramen ovale, and the canalis arteriosus, the blood reaching the heart by the inferior

cava, and consequently that of the umbilical vein is mainly directed to the head of the fœtus.

"Its brain is, therefore, receiving blood of the best quality, and in the largest quantity. In the cases to which thy observations refer, the supply of blood sent to the heart by the umbilical vein, is quickly and almost completely cut off.

"The case of the fœtus in this state is worse than if both carotids were simultaneously tied, the supply by the vertebrals being also taken away. It has been often shown by direct experiment, that suspending the supply of blood to the brain by these four channels, for a few seeonds only, is sufficient to produce immediate suspension of animation, which no means hitherto resorted to have been able to restore.

"This fact was demonstrated to me in the most striking manner by the late Sir Astley Cooper, who, finding that in the rabbit the vertebrals, as well as the carotids, can be compressed with the fingers, produced almost instantaneous death by this means.

"It is obvious that the early application of a ligature to the umbilical cord, must not merely

prevent the accumulation of blood in the after-birth, but tend to maintain the supply of blood to the brain, and promote the course of circulation proper to extra-uterine life."

The Medical Profession will be able to test my views, by careful attention to the duration of life in all cases of detention of the head in preternatural deliveries, to the condition of the infant as to asphyxia and syncope, to the state of the after-birth as to congestion or the reverse, and they will then be able to decide whether or not I am right in concluding, that the after-birth is separated as soon as the breech is expelled, and justified in compressing the umbilical cord before the delivery of the shoulders and head.

In the practice I recommend there will be no chance of the infants' bleeding to death, when the result is fatal, as I believe that they almost invariably do, and they will, therefore, be placed, not in a state of syncope, but in a time-giving condition of asphyxia, in which the duration of life can be calculated to as great a nicety as analogy with the lower animals will afford; and hence will be obtained a certain guide to the amount of risk and

endurance to which the mother is to be subjected.

I am decidedly of opinion, that in presentations of the after-birth, it will be sound practice to follow out the plan proposed of delivering it in the first instance, and instead of concluding, that the life of the infant is hopeless, as the supporters of the practice have done, it will be right to take care, in extracting the after-birth, that it be firmly squeezed in the palm of the hand, and not released until the umbilical cord is thoroughly compressed.

For the compression of the umbilical cord, a pair of forceps, which, for the sake of neatness, I have been in the habit of substituting for the ordinary ligature, is especially applicable—an instrument which has this advantage, that you can instantly enforce or relieve the pressure on the umbilical cord, which in peculiar cases, such as suspended animation from cerebral congestion, may be desirable.

The advocates of the old practice of delivery by turning have hitherto had the advantage of the supporters of the new practice in regard to the life of the infant. Let us see how far they are entitled to superiority in this respect.

Let us take the record of thirty-three cases of presentation of the after-birth which occurred at Guy's Hospital where turning was had recourse to, and which has been published in proof of the value of the old practice.* The result was eighteen living and fifteen still-born children. Of the former the sexes were equal, and of the latter twelve were boys and three girls.

The per centage proportion of male still-births over female still-births is here 25 per cent., which is far below the per centage of male still-births to female still-births from all causes, which is stated at page 3 to be 40 per cent.

The cause of this disproportion in the death of the sexes, is attributable to the comparatively large size of the head of the male over that of the female, which it will be found at page 4 to be in area one square inch; consequently, the nine living males must have had small heads, or a force must have been exerted in the delivery, to the injury of the mother.

If the sex could have been determined beforehand, the frightful operation of introducing the

* "Medical Gazette," for Dec. 1845, p. 1422.

arm into the uterus might as well have been avoided, as far as the lives of the infants were concerned, for of the fifteen deaths twelve were boys.

I do not believe any unjustifiable force was exerted in the delivery of the nine boys, of the eighteen living children, especially as Guy's Hospital was the scene of the operations, where the motto of the obstetric Professor of my day was, "Save the woman, come what may the child." It is but right, therefore, to infer that the eighteen infants were upon an equality in the diameter of their heads—consequently the deliveries would be comparatively quick, and in time to save the life of the infant.

This opinion is not a mere baseless supposition, unsupported by evidence, but is drawn from certain cases recorded for totally different purposes. I must be content, however, in order to confine myself within the space to which I am determined to limit the present essay, to refer to one of Dr. Simpson's recorded cases.

Dr. Simpson, who is at least the most powerful advocate of the new practice, if not

the founder, has thus expressed himself in reference to a presentation of the after-birth. "The after-birth was expelled some minutes before the infant, without internal hæmorrhage; the infant was expelled by natural pains, and recovered*."

The delivery of the after-birth before the infant must facilitate its delivery, for to the loss of the after-birth there would be a proportionate amount of contraction of the uterus, consequently, a considerable gain of expulsive power; and, if my views are sound, by compressing the umbilical cord there would be a gain in time, and the probability of saving the boys as well as the girls.

The construction, then, that I put upon the Guy's Hospital record is favourable to the new practice, and the sooner the operation of turning in presentation of the after-birth is laid aside the better, for it must be admitted by all, even by Dr. Robert Lee himself, to be, in every sense of the term, a rough practice.

Lastly, in the Cæsarean operation, especially when performed after death, our first and

* Braithwaite's "Retrospect of Medicine," vol. xi., p. 126.

great aim should be to secure the umbilical cord. The following successful case, during life, is to the point.

In October, 1805, M. d'Ariste, an eminent surgeon-accoucheur in the island of Martinique, performed the Cæsarean operation, during life, on a lady twenty-five years of age. The anterior wall of the uterus was laid open, and "the after-birth immediately presented itself, and was separated. The surgeon then seized the feet of the infant, and had little difficulty in completing the delivery. The infant was weak and faint for a few minutes after it was brought to light, but restored by the common cordials*."

The operation after death performed by Mr. Dawson, of Newcastle-upon-Tyne, would, in my opinion, have been equally successful if he had tied the umbilical cord as soon as he found he had cut into the after-birth. That gentleman, in relating his case, states, "I made an incision through the anterior wall of the uterus, which laid bare the membranes and divided a portion of the after-birth, from

* "Edinburgh Medical and Surgical Journal," vol. iv., p. 178.

which a quantity of black blood immediately flowed. The membranes were ruptured, and the infant was found lying with its face towards the back and left side of the mother. It was carefully removed.

"It was of small size, with a pale and flaccid skin. The heart was acting, and there was pulsation in the umbilical cord. The action in the heart, and pulsation in the umbilical cord, continued for about twenty minutes, and then ceased. All our efforts, persevered in for a length of time, could not restore it*."

In the Cæsarean operation performed by Doctor Hoëbeke, and the second of four Cæsarean operations performed on the same woman by M. Michaelis, at Kiel, the after-birth was removed before the infant, with complete success.

The woman operated upon by Dr. Hoëbeke, had arrived at the full period of gestation, and delivery had already commenced when the walls of the abdomen were divided, "the uterus opened, and the *after-birth removed.*

* "Lancet," for Sept. 30, 1837, p. 28.

The child presented its breech to the wound, and was extracted with some difficulty, for the head was already engaged in the inlet of the pelvis. The child, however, was brought into the world strong and healthy*."

In M. Michaelis' operation the *waters* had escaped, and a foot distinguished before the incision was made in the abdomen. "The after-birth immediately presented itself in the wound. This was *removed*, the left arm of the child was seized, and the infant itself was extracted as far as the head. A contraction of the uterus soon set in, and the head followed a gentle traction. The infant, a female, seven pounds in weight, was born alive. It took the breast, but died at the end of a month from an affection of the skin†."

Dr. Sclater involved his patient in the risk of losing her life from not removing the after-birth. "The uterus," in this case, "was cautiously incised, and the after-birth uncovered. The index and middle fingers of the left hand were then introduced, and the after-birth

* "The India Journal of Medical and Physical Science," vol, v., new series, p. 697.

† "Lancet," for May 2, 1835, p. 145.

detached in its superior part. The wound of the uterus was increased to the extent of the incision of the skin; the feet of the infant were seized, and delivery performed without any further obstacle. Between the extraction of the infant and the removal of the after-birth, a large quantity of blood was lost, but the hœmorrhage was suddenly arrested by delivery*.

I have for some time been engaged in examining the records of cases of this description, with the view of ascertaining the cause of death, which has not been satisfactorily determined, but I have found the subject so imperfectly treated, as to oblige me to defer it for the present.

Not that I ever intend to perform such an operation, which falls peculiarly within the province of the surgeon, who is daily in the habit of using the knife, but because I conceive it to be my duty, as an accoucheur, to investigate the subject, so as to be able, when called upon, to take a part in the operation.

* "Half-yearly Abstract of the Medical Sciences," by Dr. Ranking, vol. iv., p. 327.

The term *syncope* has not been recognized as yet as a cause of death in still-born children, and that of *asphyxia* has certainly been misapplied.

Dr. David D. Davis has thus defined asphyxia in his work on the "Principles and Practice of Obstetric Medicine;" the child is *pale*, apparently *exsanguined*, *flaccid*, *immobile*, and to all appearance perfectly without sensation. M. Baudelocque says, "in *asphyxia* the infant comes into the world *exsanguine*."

I have given at page 39, the definition of Professor Sharpey of asphyxia, from which it is evident that either Dr. David D. Davis and M. Baudelocque have misunderstood the physical signs of asphyxia, or that they have recorded what they found to be the condition of the still-born infant, clearly that of syncope, and misnamed it asphyxia.

It is evident throughout their works that they believed in the generally prevalent theory, that the preternaturally still-born infant died from pressure on the umbilical cord, which interrupted the function of the after-birth,—a function to the unborn infant analogous to that of the lungs to the adult, the unborn

infant, in fact, being considered in the position of the criminal suspended to the gallows; strangulation, it will be recollected, is a term used by some obstetric writers*.

It will be as well to define what is generally understood in using the terms asphyxia and syncope, with the view of ascertaining how far they will form a guide to the means to be adopted for the resuscitation of the preternaturally still-born child.

I am not aware that such a course has ever been followed. Much has been written on the treatment of still-born children, and every year has been fruitful in advocates for artificial respiration, the warm bath or the *cold douche*, the extraction of blood or the use of stimulants.

This difference of opinion, regarding the treatment to be adopted in still-born children, is intelligible, when it is known that there is a difference of opinion as to the cause of death; or more correctly speaking, when each obstetric professor has his own definition for terms which, in the Medical Profession generally, have a definite meaning.

* Dr. Ramsbotham and Dr. William Hunter.

For instance, to attend solely to the *cold douche*, as recommended by some accoucheurs, to the neglect of blood-letting, can scarcely be said to be adopting the best means for saving the preternaturally still-born child from asphyxia, and the abstraction of blood in the preternaturally still-born child from syncope would most assuredly be the death of the infant by the very means adopted to save it.

Apoplexy instead of asphyxia is often used to denote the still-birth marked with a livid face, a term which is objectionable to some accoucheurs; and Dr. Doherty, of Dublin, is evidently doubtful if the term asphyxia is at all applicable to the still-born child.

Dr. Doherty is the only authority I have met with in a long course of reading who has deviated from the usual routine of ascribing to the still-born child the death of asphyxia. When the infant presents by the feet, "it is apparent," writes Dr. Doherty, "the umbilical cord is very liable to suffer such compression, as will instantaneously put an end to the transmission of blood through it.

"The consequence of the circulation in the umbilical cord being suddenly annihilated must

be, that the supply of blood to the left side of the heart is at once cut off, just as if in the adult the pulmonary veins were rendered impervious, and those cavities continuing to contract, speedily empty themselves of their contents, and are then disabled from maintaining any longer the normal amount of pressure on the brain.

"Compression of the umbilical cord, then, may prove detrimental to the infant, from a total obliteration of its vessels, an almost instantaneous suspension of life, beginning at the heart*."

Dr. Doherty is in error, in supposing the circulation in the infant cannot be maintained after the umbilical cord is compressed. If I had not held the very opposite opinion to Dr. Doherty upon this point, the present essay would not have been written. I have, nevertheless, great pleasure in calling attention to the labours of Dr. Doherty, whose writings are full of instruction and interest.

It will be considered, under all these circumstances, not misplaced to clearly define what

* "Dublin Journal of Medical Science" for March, 1844, p. 68.

is meant by asphyxia and syncope, the only two conditions which I maintain are necessary to be thoroughly understood in the treatment of preternaturally still-born children; not that I intend by this remark to imply that apoplexy is unknown in the new-born child.

Asphyxia is used to denote a suspension or loss of the power of respiration, a state necessarily inducing such a change in the nature of the blood as is incompatible with the continuance of life. The change takes place in the blood, which becomes wholly venous, and is incapable of maintaining the action and vitality of the brain and spinal cord, of the heart, of the voluntary muscles, and of almost every organ of the body.

Sensibility diminishes as the blood darkens, and when it has become quite dark the power of sensation is wholly abolished. The action of the heart is always greatly affected from the very first moment that an animal is brought under this condition.

At first the contractions of the heart are accelerated, which is attributed to the violent struggles of the animal, in consequence of the emotion of fear, but in a few seconds its action

begins to be arrested, and it becomes rapidly less and less frequent until it ceases altogether.

The muscles of respiration suffer with the heart, so that the respiratory movements, indispensable to the entrance and exit of fresh currents of air, cease. In this manner are abolished, in rapid succession, the functions both of circulation and respiration.

Whatever is capable of preventing the admission of air into the lungs, or of arresting the chemical action of the air upon the blood, is capable of producing the state of asphyxia; and the circumstances which are capable of arresting the chemical action of the air upon the blood, are either mechanical or vital.

Mechanical when the entrance of air into the lungs is prevented as in hanging and drowning. *Vital* when the nervous system is at fault, causing a cessation of the respiratory movements, as in injury done to the eighth pair of nerves, or the *medulla oblongata.*

Syncope is a sudden suspension of the heart's action, accompanied by cessation of the functions of the organs of respiration, internal and external sensation, and voluntary motion; the face is pale and sunken, directly

the reverse of that which obtains in asphyxia. The sudden suspension of the heart's action may arise from two causes,—from an impression on the brain, or from a loss of blood.

In concussion of the brain the face is pale, and the limbs are relaxed, and in death from drowning, where persons have fainted at the moment of submersion, the face is also pale and bloodless, and the features sunk and contracted.

Since concussion of the brain can scarcely occur in the preternaturally born-child, and the un-born child, which can scarcely be said to have a mind, is unconscious of danger which causes persons submerged to faint, syncope can but arise in this class of still-births from an interruption to the due transmission of blood to the brain.

Into the causes which produce the different conditions of asphyxia and syncope, it is not necessary to enquire in the present essay, in which the preternaturally still-born child is alone treated. The infant, who has breathed, presents several varieties of both forms of disease, which, on account of their practical importance, require a separate consideration. In asphyxia from drowning, hanging, strangu-

lation, and suffocation, the physiological condition of the system is the same, but there is a treatment suitable for each.

The terms asphyxia and syncope, as applied to the still-born child, may very well then be expressed by the words *livid* and *blanched.* This will be a sufficient index to the treatment.

Although syncope, as I have shown, can but arise in the preternaturally still-born child from one cause, asphyxia may arise from three causes, compression of the umbilical cord, the injudicious use of ergot of rye, and pressure on the detached after-birth.

The first two causes of asphyxia are generally admitted, but the third has yet to be recognized, and I therefore offer, in support of my views on the subject, the following case of Harriet Smart, of 25, Buckingham-place, Upper Cleveland-street, who was delivered of a footling, in a quarter of an hour from the time the feet were expelled. The after-birth came away with the head, upon which it had been hard pressed by the uterus for some time.

The accoucheur feared there was serious injury done to the scalp, until the industrious use of the sponge demonstrated that it was

merely the dry blood of the after-birth. The child was still-born, and in a state of asphyxia. It breathed freely in ten minutes after birth, and in three days the livid appearance was no longer perceptible.

In all cases where the infant is born weakly, or in a state of asphyxia, M. Baudelocque recommends not to cut the umbilical cord, for some time at least after birth. He relates that since he has followed the opinions of Smellie, Leveret, and Chaussier on this subject, he has not lost a single case, although when born the child might be in a state of pretty complete asphyxia or apoplexy.

He states that, though a child be born in an apoplectic or asphyxiated state, the circulation still continues through the umbilical vein, even though the umbilical arteries should have ceased to beat, and that the premature section of the umbilical cord takes away one of the chief aids to its revival*.

M. Baudelocque, from his own showing, is here but practising a mode of abstracting blood, in which the receptacle is the after-

* "Edinburgh Medical and Surgical Journal" for Oct., 1841, p. 546.

birth instead of a basin, acting as a drain, which if continued for an indefinite period, as as in cases of detention of the head, would terminate in death from syncope, and his practice, therefore, I may fairly quote in illustration of my own, but the manner in which M. Baudelocque accounts for the removal of the congestion in the infant can scarcely, I conceive, be accepted by the physiologist.

In asphyxia in the preternaturally still-born child the treatment in all cases is the same, the abstraction of blood being one of the most powerful remedies. In syncope the *cold douche*, and the most careful attention to the temperature of the atmosphere in which the infant is placed, are among the essentials to recovery.

The treatment of still-born children is a subject by itself. My present object is attained by having called attention to the chief cause of mortality in still-born children, and to the preservation of infants in delivery.

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